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A FUNDAMENTAL PROBLEM IN THE REORGANIZATION OF THE HIGH SCHOOL

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At a meeting of the Department of Superintendence held in Cincinnati in 1915, formal action was taken by the Department, giving its approval to the six-year high school. At the same meeting, the federal commissioner of education, Dr. Claxton, advocated the general adoption of the six-year high-school plan throughout the country. Further, the six sessions of the Commission on the Reorganization of Secondary Education, held in connection with the Department of Superintendence, were largely devoted to problems directly or indirectly affecting this topic. In a number of commonwealths state officers of education have frankly advocated the adoption of the six-year high-school plan in some form. If one examines the educational literature of the past few years, he will find that few problems have received as much attention as the reorganization of the secondary schools. All these facts point toward one end, that the movement for the six-year high school which has been agitated more or less strongly for two or three decades has ceased to be a matter of purely academic discussion and is becoming a very real and practical problem of organization. This is seen, further, in the number of cases in which a six-year high school has been actually put into operation.

A movement which will mean such an extensive reorganization of our entire school system demands exhaustive analysis. If the plan for the six-year high school is to be put into general operation, it is imperative that the specific changes which are to be made shall rest on sound fundamental principles. There is always the danger that boards of education and school officials seizing on the general proposition without a careful analysis of the various specific problems that are involved may encourage a reorganization of the system which may prove superficial and fail to solve the basic

difficulties. There is always the danger that the reorganization may be one in name only and that the real reforms to be made may be quite neglected. That this is a real danger is apparent to any student of secondary education who has examined the actual programs and the actual organization of many of the high schools which have recently been organized as six-year high schools or on the junior and senior high-school plan. Many of these reorganized schools have entirely failed to carry out the changes which are really vital in the reorganization of the school system.

It is not my intention, in discussing the problem before us, to attempt an analysis of all the factors which must be involved in any scheme for the reorganization of the high school, but rather to call attention to one fundamental principle which is, in my opinion, either neglected or misinterpreted in many cases. I propose to discuss the organization of the school system as affected by the nature of the development of boys and girls between the ages of approximately twelve and eighteen years.

When one examines the literature of secondary education he finds it replete with references to the high school as the institution for the education of adolescent boys and girls. It is constantly maintained that adolescent boys and girls differ quite radically from preadolescent boys and girls and hence that the methods and materials of teaching, the organization and administration of the high school, being adapted to the needs of adolescents should differ radically from the methods and materials of teaching, the organization and administration of the elementary school. It is further commonly maintained that the change from preadolescence to adolescence is relatively sudden and abrupt and hence that a relatively radical differentiation may be made between elementary education and secondary education. This sudden and abrupt change which is supposed to occur at adolescence has been made the basis of the distinction between the elementary school and the secondary school. For many years the assumption that relatively sudden and abrupt changes take place in the individual at the age of approximately fourteen years has been made the justification of our present division between elementary and secondary education. More recent studies of the phenomena of adolescence

have been interpreted to indicate that the adolescent period usually begins at an earlier period than at the age of fourteen, probably nearer the age of twelve. As a result the assertion is now made that the high school should begin at that age.

A recent writer presents the argument as follows:

Again, the present mode of organizing and administering educational work in America is ill grounded. The adolescent period begins usually at about the age of twelve years. With the dawn of this new period come most notable changes in physical form, structure, and function, and most decided concomitant psychological changes. At this period self-consciousness is born. The interests that formerly held dominant sway are cast aside. New motives stir, new aspirations fire, new goals beckon. Conscious logical reason begins to proclaim itself. . . . The beginning of adolescence is most emphatically the beginning of the period of secondary education. As our schools are organized today this fact is ignored.¹

Here we have the propositions clearly set forth that adolescence is a period of marked and abrupt change in the character of the individual, that adolescence begins at approximately the age of twelve, that the beginning of adolescence should mark the beginning of secondary education, and the implication that our schools can be organized on that basis. The same general principles were enunciated by Dr. Claxton in his address before the Department of Superintendence at its last meeting when he recommended the six-year high-school plan on the basis of marked physical and mental changes which take place in boys and girls at approximately the age of twelve. The argument is one of the stock arguments set forth in support of the six-year high-school plan.

Now, if this theory is correct, if there is good ground for believing that a somewhat radical change takes place in boys and girls at approximately the age of twelve years, so that pupils at the age, let us say, of twelve years are radically different from those same pupils at the age of eleven, or pupils of the age of thirteen years are radically different from the same children at the age of twelve, there is justification for making a sharp division of education between the two ages. The whole question, however, will bear closer investigation. Three fundamental problems are involved. The first is whether there is any one age at which the individual

¹ C. O. Davis, quoted at p. 69 of Johnston and others, *High-School Education*.

in his development undergoes markedly greater changes in his mental make-up than at any other period with reference to inner growth alone. Is the nature of the development of the individual such that there are in general periods of relatively rapid growth and relatively slow growth, or is the development essentially gradual and continuous with no marked points of sudden and abrupt change? Here we have on the one hand the theory of saltatory development with particular reference to somewhat sudden and abrupt changes in the individual at the beginning and during adolescence. Such is the theory propounded by Dr. Hall and his school which is in general adopted by the writers above mentioned. On the other hand, we have the theory of gradual development suggested by Dr. Thorndike who holds that in so far as mental traits have been measured "they give no support to the theory of the sudden rise of inner tendencies. Indeed every tendency that has been subjected to anything like rigid scrutiny seems to fit the word 'gradual' rather than the word 'sudden' in the rate of its maturing." To quote further from Dr. Thorndike:

The one instinct whose appearance seems almost like a dramatic rushing upon life's stage—the sex instinct—is found upon careful study to be gradually maturing for years. The capacity for reasoning shows no signs by any test as yet given of developing twice as much in any one year from five to twenty-five as in any other. In cases where the difference between children of different ages may be taken roughly to measure the inner growth of capacities, what data we have show nothing to justify the doctrine of sudden ripening in a serial order.¹

This is neither the time nor the place to discuss the validity of the arguments adduced by advocates of the theories of saltatory development and of gradual development. It is sufficient for our purpose here to recognize that it is by no means a theory universally accepted that there is an age at which the beginning of secondary education should be determined because of sudden changes which occur in the psychological development of children at that age.

If, however, for the purpose of the argument, we grant the validity of the theory of saltatory development, we will have two problems which must be solved before we should be justified in

¹ E. L. Thorndike, *The Original Nature of Man*, pp. 260-63.

determining the beginning of secondary education at the stage of maximum change. It is recognized that the time of the onset of pubescence differs for boys and girls, that the time varies for either group, and that the duration of the process of change varies. Since we are dealing with a variable quantity it is important to know, not only the central tendency of the age at which adolescence begins (e.g., the average age for the beginning of adolescence), but also the amount of the variation from that central tendency. If, for instance, the central tendency of the age for the ending of prepubescence and the beginning of pubescence in the case of boys is found to be fourteen years and the variation were such that the majority of boys began to be pubescent within a few months of that age, a working scheme allowing for adolescence would be possible. If, on the other hand, the variation is such that a range of a year or two from the central tendency age would be found necessary in order to include even a majority of boys, any definite adaptation of organization, subjects of study, or teaching method to the needs of the adolescent becomes impossible except in the most general way. The importance of this factor becomes clear when we consider the results of Dr. Crampton's measurement of nearly five thousand high-school boys of New York City, where he found that for the ending of prepubescence and the beginning of pubescence the middle of the mean years was fourteen years, the average age 13.44 years, with a variability of, more or less, 1.55 years or more than a year and a half. This means that with an average date marking the beginning of pubescence of about thirteen and one-half years, it required a range of more than three years to include only one-half of the boys measured. No satisfactory data of this character are available for girls, but it is worthy of note that the difference in the central tendencies of dates for the beginning of pubescence of boys and girls serves to make the situation more complex and to render any scheme for adapting the beginning of secondary education to the needs of adolescents impossible in any other than a general way.

In this connection the table of prepubescent, pubescent, and postpubescent boys of various ages (Table I) presenting the results of Dr. Crampton's measurements are most instructive. The figures

are well known but I shall quote them here as the basis of a rough study which I have made of a number of school systems.

TABLE I¹

| Age in Years | Pubescent (Immature) | Pubescent (Maturing) | Postpubescent (Mature) |
|-------------------|-------------------------|-------------------------|---------------------------|
| | Per cent | Per cent | Per cent |
| 12.50-13.00 | 69 | 25 | 6 |
| 13.00-13.50 | 55 | 26 | 18 |
| 13.50-14.00 | 41 | 28 | 31 |
| 14.00-14.50 | 26 | 28 | 46 |
| 14.50-15.00 | 16 | 24 | 60 |
| 15.00-15.50 | 9 | 20 | 70 |
| 15.50-16.00 | 5 | 10 | 85 |
| 16.00-16.50 | 2 | 4 | 93 |
| 16.50-17.00 | 1 | 4 | 95 |
| 17.00-17.50 | 0 | 2 | 98 |
| 17.50-18.00 | 0 | 0 | 100 |

The important thing to note here in connection with the special point at issue is the amount of variation which is evident. Assuming that we should be able to group all boys of the age of thirteen in a single grade, on the basis of the results of Dr. Crampton's measurements we should find approximately one-half of the boys (41-55 per cent) immature, approximately one-quarter (26-28 per cent) maturing, and approximately one-quarter (18-31 per cent) already mature. Surely we cannot hope to adapt the organization, the methods and materials of teaching to the needs of the adolescents in that group except in the most general way. I have applied the estimates made by Dr. Crampton to the age-grade distribution of the first grade in a number of city high schools. In every case on the basis of his estimates we should find approximately one-quarter of the first-year high-school boys immature, about one-fifth in the maturing stage, and about one-half in the matured stage. Anything like close adaptation of methods, etc., to such conditions is out of the question. The variability is altogether too great to permit it.

With certain rough estimates of the distribution for ages below the ages given by Dr. Crampton I have made a rough estimate of the variability of boys (grouping them as immature, maturing,

¹ C. W. Crampton, "Anatomical or Physiological Age *versus* Chronological Age," *Pedagogical Seminary*, XV, 230-37.

and mature on the basis of his percentages) in a number of school systems from the first grade of the elementary school to the last grade of the high school. Table II indicates the results of applying such a measure (admittedly a rough measure only) to the age-grade distribution of boys in the Paterson (New Jersey) High School of 1912.

TABLE II

| Grade | Immature | Maturing | Mature | Total Non-Mature |
|----------|----------|----------|----------|---------------------|
| | Per cent | Per cent | Per cent | Per cent |
| I..... | 99.6 | 0.4 | 0.0 | 100.0 |
| 2..... | 98.9 | 1.1 | 0.0 | 100.0 |
| 3..... | 95.0 | 4.4 | 0.6 | 99.4 |
| 4..... | 88.8 | 8.8 | 2.4 | 97.6 |
| 5..... | 77.8 | 16.7 | 5.5 | 94.5 |
| 6..... | 64.8 | 23.1 | 12.1 | 87.9 |
| 7..... | 50.8 | 25.2 | 24.0 | 76.0 |
| 8..... | 35.0 | 23.7 | 41.3 | 58.7 |
| I..... | 25.3 | 21.8 | 52.9 | 47.1 |
| II..... | 8.2 | 12.9 | 78.9 | 21.1 |
| III..... | 3.5 | 7.5 | 89.0 | 11.0 |
| IV..... | 1.1 | 2.7 | 96.2 | 3.4 |

The age-grade distribution of boys in the Paterson High School for the year 1912 represented no unusual situation and may be taken as fairly typical of the majority of high schools in the country. If the rough estimates given above are even approximately correct, a number of important facts are to be noted. In the first place, we may note that from the first grade of the elementary school to the last grade of the high school the proportion of immature boys decreases gradually and the proportion of mature boys increases gradually. The change between the first and second years of the high school is, however, noteworthy. The second point to be noted is that (in this particular school at any rate and for the particular time when the figures applied) Grades 7 and 8 of the elementary school and Grade I of the high school represented a transition period, three-quarters of the boys in the seventh grade being either in the immature or maturing stage and three-quarters of the boys in the first year of the high school being either in the maturing or mature stage. The distribution manifest, however, indicates clearly that the change from elementary-school methods to high-school methods must be gradual and that any sharp distinction

between elementary education and secondary education at the beginning of the seventh grade is impossible on the basis of the stage of development reached. In the third place, it may be noted that in each grade from the first through the sixth grade of the elementary school the groups are fairly homogeneous in the sense that they are predominantly composed of non-mature boys. In the fourth place, it may be seen that for the last three grades of the high school the groups are fairly homogeneous in the sense that they are predominantly composed of mature boys. Perhaps it would not be forcing matters too much to indicate the conditions for boys in the school measured somewhat as follows:

- Grades 1-6: Boys predominantly non-mature: group fairly homogeneous;
- Grades 7-I: Boys in transition stage: group widely variable;
- Grades II-IV: Boys predominantly mature: group fairly homogeneous.

I have applied the same criteria to a number of city school systems with results sufficiently close to those found in the Paterson schools to warrant a personal opinion that the conditions found in the latter schools are fairly typical.

Now, if these conditions may be considered typical and if we assume that noteworthy psychological changes accompany the physical changes which are found in the prepubescent, pubescent, and postpubescent stages of the development of boys, a certain justification may be found for the division of the school system indicated above as far as boys alone are concerned. Unfortunately, however, what data we have regarding the developing of girls before, at, and after puberty would indicate that the factor of coeducation would seriously affect any such division.

One point further must be emphasized before this topic is left. It is obvious that from the standpoint of the development of boys there is a critical period in Grades 7, 8, and I. It is in those grades that the greatest amount of variability is found with reference to the stages of development. The greatest difficulty in adapting the organization, materials, and methods of teaching to the needs of the pupils must come at the stages where there is the greatest amount of variability. As far as the phenomena of adolescence are concerned, it is clear that the variability is greatest in the seventh and eighth grades of the elementary school and in the first

year of the high school. It follows, therefore, that any attempt to make a sharp differentiation between elementary and secondary education, either between the eighth grade of the elementary school and the first year of the high school, as our system is at present organized, or between the sixth and seventh grades of the elementary school, as is contemplated by many advocates of the six-year high-school plan, is quite unjustifiable. This is true even if we adopt the theory of saltatory development.

If we assume that the theory of saltatory development is correct, that there is a relatively sudden and abrupt change in children at the beginning of adolescence, that that change comes approximately at the age of twelve as some have maintained or at any other age, and further, if we assume that the variation from the central tendency is relatively small—small enough to permit children to be divided into groups relatively homogeneous with reference to chronological age and degree of maturity—if we assume all these things, we still have a third problem arising out of the common phenomena of the age-grade distribution of pupils in our public schools. Dr. Ayres in his report of the school survey in Springfield, Illinois, called attention to the fact that thirteen-year-old children were found in every grade from the first year of the elementary school to the third year of the high school in that city. A study of the age-grade distributions in more than twenty-five cities has convinced me that this is by no means an exceptional case. It is rather the rule. In more than one school system I have found pupils of the age of thirteen, fourteen, and even fifteen years in every grade from the kindergarten to the last year of the high school. Such cases, of course, merely represent the extremes of distribution. What is more to the point is the fact that in many, if not in most, school systems of children of any age group from twelve to fifteen or sixteen we rarely find as large a proportion as one-third in any single grade. Of the remaining two-thirds the distribution is commonly widely extended above and below the grade in which the mode falls. In Table III is presented the composite distribution according to age and grade of children in six city school systems (chosen at random) in terms of the percentages of each age group in the different grades of the elementary and high schools.

Only one of some thirty school systems examined showed an age-grade distribution which differed in any noteworthy respect from that represented in Table III and it is probable that the distribution indicated in the table is fairly typical of conditions in most school systems. If so, the very practical question arises: How can we adapt the organization and administration, the materials and method of teaching to the needs of the adolescent under conditions such that in no one grade do we get more than one-third

TABLE III

PERCENTAGE OF PUPILS OF DIFFERENT AGE GROUPS IN VARIOUS GRADES IN THE SCHOOLS OF SIX CITIES. TOTAL NUMBER OF PUPILS CONSIDERED WAS APPROXIMATELY 35,000

| Grade | Age 12 | Age 13 | Age 14 | Age 15 | Age 16 | Age 17 |
|----------|----------|----------|----------|----------|----------|----------|
| | Per cent | Per cent | Per cent | Per cent | Per cent | Per cent |
| I..... | 0.7 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 |
| 2..... | 1.9 | 0.8 | 0.4 | 0.1 | 0.1 | 0.1 |
| 3..... | 5.8 | 2.8 | 1.5 | 0.6 | 0.4 | 0.0 |
| 4..... | 11.7 | 6.7 | 3.4 | 2.0 | 0.6 | 0.1 |
| 5..... | 22.1 | 13.2 | 7.1 | 3.3 | 1.4 | 0.3 |
| 6..... | 28.2 | 21.5 | 12.2 | 6.6 | 1.9 | 0.8 |
| 7..... | 21.6 | 27.5 | 21.3 | 12.7 | 5.8 | 1.7 |
| 8..... | 7.0 | 19.8 | 28.5 | 19.6 | 12.6 | 4.6 |
| I..... | 0.9 | 6.4 | 15.9 | 27.5 | 20.7 | 10.9 |
| II..... | 0.1 | 1.0 | 8.7 | 22.0 | 31.0 | 26.6 |
| III..... | 0.0 | 0.0 | 0.8 | 4.8 | 19.4 | 27.9 |
| IV..... | 0.0 | 0.0 | 0.0 | 0.6 | 5.9 | 27.0 |

Percentage of 12-year-olds in the sixth grade or below: 71.5
 " " 13 " " " " " " " " 45.2
 " " 14 " " " " " " " " 24.8
 " " 15 " " " " " " " " 12.5
 " " 16 " " " " " " " " 8.5
 " " pupils 12 years old or older in the sixth grade or below: 37.6

of the pupils of any given age group? It is argued that important changes calling for adjustment come with adolescence; it is argued that adolescence begins at approximately the age of twelve; it is argued that the high school should begin with children at the age of twelve. The obstinate fact is that we do not get even a large proportion of the children of the age of twelve or even of thirteen in the seventh grade. In order to apply any scheme of instruction which accords with a theory of adolescence based on chronological age it is first necessary that we should be able to group the children so that the age group may be fairly homogeneous. What the

relation is between chronological, physiological, and mental ages and how it might affect the situation we do not know as yet, but our ignorance on that point does not justify the presumption that the problem would be more easily solved if we were dealing in terms of psychological age rather than in terms of chronological age. The arguments as commonly adduced have been in terms of chronological age and for that reason the analysis here presented has been made in the same terms.

It was stated at the beginning of this paper that the argument for the "six-six" plan on the basis of the character of the development of boys and girls involved three problems. These have been briefly considered. The theory of saltatory development which forms the basis of the argument is itself open to question. If, however, we grant the validity of that theory, the recognized wide variability of the age at which puberty comes precludes any attempt to organize our schools on the basis of the phenomena of adolescence. Finally, even if we should grant the validity of the theory of saltatory development and even if we should assume that the variability were small enough to permit fairly homogeneous grouping, the age-grade distribution of pupils in the school system prevents us from adapting the organization to the needs of the adolescent in any other than a general way.

It is the opinion of the writer that the belief that the phenomena of adolescence demanded or justified a rather radical differentiation between elementary and secondary education has in the past done more to damage the work of the early grades of the high school than any other one factor. The gap between the last grade of the elementary school and the first grade of the high school as our system is at present organized is great and the readjustment which faces a boy or girl when transferred into the high school is tremendous. It is one of the principal aims of the reorganization of our system of education to eliminate that gap, to facilitate the necessary adjustment, and to ameliorate the articulation between elementary and secondary education. Many dangers beset us in our attempts to reorganize the school system on the six-six or the six-three-three plan. Not the least of those dangers is the danger that in making the reorganization we may merely transfer the difficulty so that it will come two grades earlier. Emphasis on

the theory that sudden and abrupt changes occur at adolescence, that those changes should mark the beginning of secondary education, and that the high school should begin at the age of twelve because of those changes, may well serve to perpetuate the very difficulties which it is one of the chief objects of the plan for reorganization to eliminate.

If we adopt the theory of gradual development with reference to mental traits, we must recognize that our school system should be so organized that from the first grade of the elementary school to the last grade of the high school the change for the pupils will be gradual and without points of abrupt transition, without sharply differentiated administrative divisions, and without radical changes in materials and methods at any one stage. If we adopt the theory of saltatory development we are forced to the same conclusion because of the variability found at any one stage and because of the distribution of pupils throughout the grades. We must certainly relegate to the limbo of discarded absurdities the theory that at any one period "self-consciousness is born" and that "conscious logical reason begins to proclaim itself." We must recognize that the boy or girl of seventeen or eighteen is quite different from the boy or girl of eleven or twelve, but we must also recognize the fact that when we are dealing with large groups of children the character of training appropriate to the intervening stages must vary gradually from grade to grade.

The six-year high-school plan offers a solution to many of the perplexing problems in our school organization most of which center around the seventh and eighth grades of the elementary school and the first year of the high school as they are at present organized. The demands for reform are imperative and the indications are strong that they will be met. It is of the utmost importance that the reform of the work of the present seventh and eighth grades of the elementary school and the first grade of the high school be undertaken with the understanding that those grades represent distinctly a transition stage and that the changes which are made be undertaken with the intention of providing a gradual and continuous transition in which the conception of a radical differentiation between elementary and secondary education plays no part.